J. Keate

A DISSERTATION ON THE INOCULATED SMALL-POX.

O R,

An ATTEMPT towards an Inveſtigation of the Real Cauſes which render the SMALL-POX BY INOCULATION, ſo much more mild and ſafe, than the ſame Diſeaſe when produced by the ordinary Means of INFECTION.

By JOHN MUDGE, SURGEON,
At PLYMOUTH.

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THE

PREFACE.

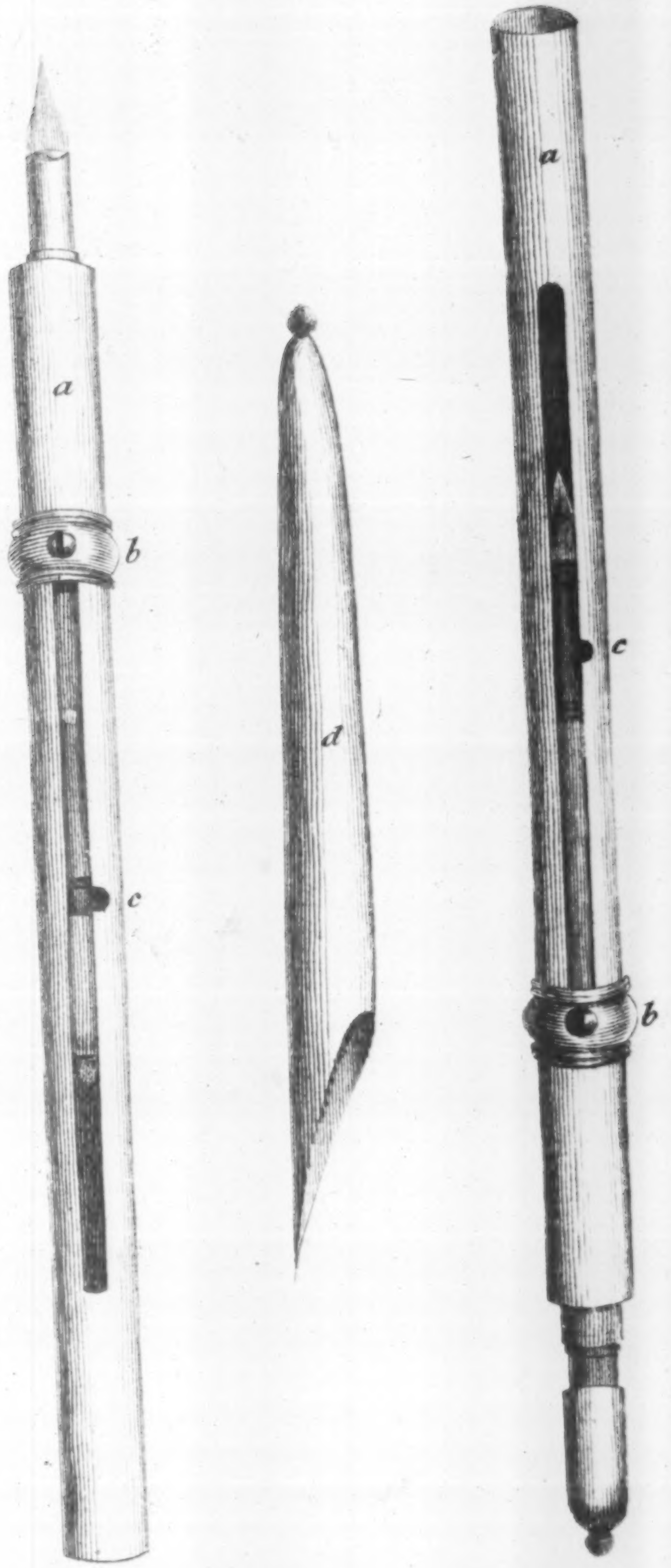
IN the following eſſay I have ſtudiouſly, and as much as poſſible, avoided all philoſophical ſpeculation; for tho' this ſpecies of reaſoning may ſuit well enough with a luxuriant imagination, it, however, ſeldom enforces conviction on a ſtrong underſtanding, or affords practical deductions. For this reaſon, therefore, I have not amuſed myſelf with taking the configuration of the particles of the poiſonous miaſmata into conſideration, nor conſequently the different effects which may be produced by their being round, ſquare, or angular; nor have I troubled myſelf even to enquire, whether the globules of a diſſolved blood are reduced into oblate ſpheroids, or broke into irregular moleculæ. In ſhort, in this Diſquiſition I have not attempted ed a flight upon the wings of hypotheſis into the regions of uncertainty; on the contrary, the principles upon which the inquiry is founded, are either ſelf-evident truths, or phyſical maxims univerſally acknowledged; and the reaſoning deduced from them, ſuch as it is, ſo calculated for the general underſtanding, that its force may be felt as well by thoſe who have not made phyſic their ſtudy, as by thoſe who have.

Popular information was indeed one great motive to this inquiry; for though the credit of inoculation is now pretty generally eſtabliſhed, yet there are ſtill a great number who are not altogether diveſted of their prejudices againſt it; and I am not without hopes, that the following conſiderations may remove their ſcruples, partly by informing their underſtandings, and partly by alarming their fears.

To the medical reader I ſhall only ſay, that for the above reaſon, quotations from phyſical authorities have been intentionally avoided; and that tho' he may poſſibly in this treatiſe meet with ſome things, which, unknown to me, have been before publiſhed, or which his own ideas may have ſuggeſted to him; I am, however, willing to hope, that neither his ſpeculative nor practical expectations will be intirely diſappointed.

(a) **The Instrument** with the lancet and ſponge expoſed at the different ends. When both of theſe are concealed, the ſliding ring *(b)* is conſequently then in the middle of the caſe; and by giving it a ſmall turn, the ſcrew-pin may be made to fall into the notch *(c)*, ſo as to ſecure the lancet and ſponge from injury in the pocket by accidental expoſure.

(d) A quill and ſponge.



Jn. Lodge Sculp.

A
DISSERTATION
ON THE
INOCULATED SMALL-POX.

THERE is not perhaps a diſeaſe to which the human race, is expoſed, that differs more from itſelf at different times than the natural Small-Pox. We ſometimes ſee this diſorder ſo mild and benign, as ſcarcely to expoſe the patient to more danger than a common cold; and at others, exaſperated by a degree of malignity and virulence, little, or perhaps not at all, inferior to the plague itſelf.

Inoculation, or the artificial method of producing it, has in a great meaſure ſtripped this formidable diſeaſe of its terrors; and in general rendered its aſpect milder, its progreſs more uniform, and very little hazardous to the patient; I ſay in general, for we have inſtances, now and then, even in inoculated ſubjects, (though leſs frequent in the modern than the old method of inoculation) where this diſeaſe puts on a threatening appearance, and ſome few where it proves mortal.

THAT the diſcovery however of the artificial method of producing the ſmall-pox, has, notwithſtanding a few examples of ill ſucceſs attending it, ſaved the lives of thouſands, and been of infinite uſe to mankind, is too manifeſt at this time of day to admit of a diſpute; and theſe conſiderations have, we find, ſo far operated on the greater part, in ſpite of all thoſe conſcientious ſcruples ignorantly raiſed againſt this ſuppoſed innovation upon the ordinary œconomy of Providence, as to diſpoſe them to give their ſanction, and ſet their ſeal to its utility.

INDEED inoculation has been treated, and at laſt received by the world, as every new diſcovery of importance always has, and ought to be; for as on the one hand it would be capriciouſly childiſh, and in matters of importance dangerous, at once to embrace every novelty, or pretence to an uſeful diſcovery; ſo on the other, prudence and caution become juſtly cenſurable, when carried to ſuch lengths as to deprive us of the advantage of any mode of practice which has ſtood the teſt of time and experience.

THE difference between the natural and artificial ſmall-pox is indeed ſo amazing, that one ſhould think a mind poſſeſſed with any thirſt after knowledge, could never reſt ſatisfied from mere motives of ſpeculation, till it had attempted an inveſtigation of thoſe cauſes which give riſe to ſo very extraordinary a phœnomenon, even ſuppoſing no practical indications could be drawn from a diſcovery of them: how much ſtronger then muſt the inducements to this inveſtigation be, from the great reaſon there is to conclude that the moſt ſalutary effects will reſult from it; for inoculation, mild and little hazardous as it is, has now and then ſome unfavourable and untoward ſymptoms, of which perhaps ſuch a diſcovery might enable us to diveſt it.

Moreover, if we could be aſſured to what cauſes the happy alteration made in the diſeaſe by inoculation is owing, it is more than probable we might ſo far avail ourſelves of this knowledge, as to be able to leſſen in ſome meaſure the danger of the natural ſmall-pox; a conſideration of the utmoſt importance.

PRACTITIONERS, however, ſeem to reſt ſatisfied with the great and ordinary ſucceſs attending inoculation for the ſmall-pox, as it is in general practiſed, without inquiring into the cauſes by which it renders this terrible diſorder not merely leſs formidable and dangerous than it is in the natural way of infection, but altogether mild and gentle. Various authors indeed have attempted to improve upon, and perhaps ſucceſsfully to account for the advantages of the modern over the old method of inoculation; but I do not recollect any author who *profeſſedly* endeavours to inveſtigate the real cauſes of that difference which has *always* ſubſiſted between the natural and inoculated ſmall-pox, under every mode of management; and except the trite, but inadequate ones, of phyſical and dietetic preparation, together with the ſuppreſſion of the eruptive fever by occaſional expoſure to cold, we ſeem altogether at a loſs to what cauſes we muſt attribute the great and certain advantages attending inoculation; the principal of which are very few eruptions, and, except in a very few inſtances, an abſence of the ſecondary fever.

Doctor Mead indeed, in his Diſcourſe on the Small-pox, (p. 195.) occaſionally ſays, "I have often conſidered for what reaſons it is that "the inoculated is ſafer than the natural ſmall-pox, and the following

“ ſeem to me to be the chief. Firſt, “ the venom is communicated to a “ young, healthy, and, for the age, “ ſtrong body. In the next place, “ the violence of the fever which follows, is prevented, if there be oc- “ caſion, by bleeding and gentle purging. And laſtly, through the whole “ time that the contagious matter is “ exerting its malignity upon the “ humours, (which is generally eight “ or nine days) quietneſs, moderation “ in diet, and every thing elſe, is “ ſtrictly obſerved; whereas many “ incur the natural diſorder when the “ blood is heated with wine and exer- “ ciſe, by which means all the ſymp- “ toms muſt neceſſarily prove more “ ſevere and dangerous. Some have “ alſo been of opinion, that the diſ-

"charge out of the wound made to "introduce the purulent matter, and "likewiſe from the ſmall pimples "which break out round it, may "contribute ſomething to the ſafety "of the patient. But the ſmall quan-"tity which runs out this way, can-"not, I think, avail much." Thus far Dr. Mead. But, with all deference to the opinion of ſo great a man, the reaſons here aſſigned do not ſatisfactorily account for the benign ſymptoms *always* attending inoculation, and particularly for the eſſential difference between the natural and artificial diſeaſe, ariſing from the almoſt invariable want of the *ſecondary fever* in the latter.

For though we cannot but ſuppoſe the cauſes here mentioned have a ſalutary tendency, yet that the great and conſtant ſucceſs attending the operation does not depend upon them ſolely, is certain; for, beſides that the ſame moderation in diet has been obſerved, and the ſame mercurials employed by perſons, who, not chuſing to ſubmit to inoculation, and yet being almoſt certain of undergoing the diſeaſe from a vicinity of infection, have thought to avail themſelves of ſuch cautionary means, without producing a diſeaſe at all ſimilar to that by inoculation; beſides this, I ſay, perſons of all ages, (after that of infancy, which by the bye is found the moſt improper of all) and without any preparation, or phyſical management, during the whole proceſs; nay, without any particular attention to diet, have paſſed through the diſorder with the utmoſt ſafety. How many inſtances might be produced (ſufficiently mortifying to regular practitioners) where patients have been inoculated, or through whim or caprice have inoculated themſelves, without any of thoſe prudential precautions, and yet the event has been full as favourable as if they had been all minutely attended to, and the ſmall-pox produced has preſerved the eſſential characters of the artificial ſort.

A FEW years ſince I had ordered a young man of twenty, of a plethoric habit, to be bled for a pain in his ſide, which wore off ſoon after the bleeding without any other medicinal aſſiſtance; nor did he pay the leaſt attention to his diet, but fed heartily. About a fortnight after, he called upon me to ſay that he ſuppoſed it would be neceſſary for him to take a doſe or two of phyſic, as he had ſome pimples about him which were rather ſore and troubleſome. There was no appearance on his face or hands; but on ſhewing me his breaſt, I ſaw about half a dozen very large and fair puſtules exactly reſembling the ſmall-pox, but ſo far on the decline, that the inflammation at their baſe was totally gone. I aſked him whether he had ailed any thing, had had any complaint in his head, ſtomach, or back, any ſhiverings, or been at all feveriſh of late, or ſince his laſt bleeding. He told me, No. Though very certain it was the ſmall-pox, I did not care, even then, to alarm him with the diſcovery; and only telling him that he need not, for the preſent, pay any attention to thoſe eruptions, and that I would order ſome phyſic for him a day or two hence, I ſent him away. Juſt after he was gone, my apprentice, who came with him, and was the perſon who had bled him, ſtepped back, and deſired I would examine the arm in which he had been bled, for that he believed he had been inoculated by the lancet with which ſome variolous matter had been taken about a month or ſix weeks before, though he aſſured me at the ſame time that he had cautiouſly wiped it afterwards. The inſpection of the arm converted this ſuſpicion into certainty; for the orifice was become a ſcab, which had been enflamed round the edges, with many ſurrounding puſtulary appearances; and, on inquiry, he told me that the orifice began to enflame and be troubleſome ſome few days after bleeding.

This, and numberleſs other inſtances, though I hope not of the ſame kind, yet to the ſame purpoſe, which muſt have occurred to experienced practitioners, cannot fail to convince us that the great advantages of inoculation can never ariſe from the mere circumſtances of diet or medicine.

Nor can it depend upon (what at firſt ſight would ſeem probable, and has been ſuggeſted) the benign quality of the variolous matter with which the patient is infected; for though any ſort of this poiſon will certainly produce the diſeaſe, yet general experience, and many particular experiments ſhew, that the *ſame* matter will not always produce the *ſame* degree of the diſeaſe. The ſmall-pox, produced in the natural way in many perſons of a family, all infected probably by one and the ſame patient, will nevertheleſs be of as many different characters, and ſometimes too in the oppoſite extremes of mildneſs and malignity. And in inoculation we actually find, that be the infecting matter ever ſo mild, it will not equally ſtamp its own benign character on the diſeaſe produced by it in different ſubjects, but, in ſome few caſes, be productive of a virulence that never ſubſiſted in itſelf. On the other hand, ſeveral patients have been inoculated from a confluent ſmall-pox, which had proved mortal to its own ſubject, and yet have had the diſorder in a very favourable way. Others have been inoculated from malignant ſorts with equal ſucceſs; nay, which is ſtill more, we are told by Chandler in his eſſay, that in inoculating hoſpitals, perſons have been ſafely infected with matter which had been taken off after the death of the patient. Theſe, and other inſtances which muſt have occurred to men of buſineſs in this way, plainly ſhew that the *benignity* of the infecting matter has very little ſhare in the wonderful effects of inoculation.

SOME have ſuppoſed great and myſterious advantages to have ariſen from uſing the variolous matter in a crude ſtate, taken from the arm of the patient before it has been ſublimated into a high degree of acrimony by the eruptive fever. Indeed it has been conſidered as Sutton's ſecret, and that to which his ſucceſs has been principally owing. How far the ſuperior advantages of uſing matter in this ſtate have been actually confirmed by the practice of thoſe who have recommended it, I cannot pretend to ſay; but from ſome remarkable inſtances which I have lately ſeen myſelf, I have great reaſon to believe that this mode of proceeding is a very uncertain method of infecting the patient, and therefore a hazardous refinement of the operation. Poiſoning the ſkin, or part itſelf to which the virus is applied, locally, and infecting the conſtitution, generally, are two diſtinct conſiderations. The pocky matter applied to a ſcratch made on the ſkin of a perſon paſſed the ſmall-pox, will repeatedly, and almoſt conſtantly, enflame the part, and raiſe a pimple, which will itch, ſmart, and be troubleſome; in ſhort, will produce an appearance ſimilar to that which we ſee on the arm of an inoculated patient five or ſix days after inoculation. This is an experiment which I have often tried upon myſelf. Whenever I have inoculated a patient at a diſtance, whom for that reaſon I could not conveniently ſee for ſome days after, in order to know whether the matter applied, more eſpecially if not quite freſh, was ſufficiently active, I have uſually put it to a ſimilar ſcratch on my own hand, which if it was efficacious, but not otherwiſe, never failed to enflame, and of courſe informed me whether or no, on my next viſit, it would be neceſſary to provide myſelf with freſh matter for my patient.

The ſimple inflammation of the puncture, and the ſubſequent puſtular appearance, are therefore no proofs that the poiſon reaches the conſtitution; nor can we ever have any aſſurance that it actually doth ſo, till it is proclaimed either by the eruptive fever, or ſucceeding eruptions on the general ſurface of the body. The inſtances which I above hinted at, as having lately fallen under my notice, are an indubitable proof of this aſſertion. Meſſrs. Langworthy and Arſcott, ſurgeons, in the ſpring of 1776, inoculated at Plymton, a neighbouring town, forty patients; of which number thirty were infected with crude matter from the arm of a young woman, five days after ſhe herſelf had been inoculated with concocted matter, which did eventually produce in her a pretty ſmart fever, and a ſufficient number of eruptions. The other ten were inoculated with matter of another kind, which I procured, in a concocted ſtate, from a puſtule of the natural ſmall-pox. The arms of all the forty patients took the infection; and the latter ten, after the eruptive fever, had the ſmall-pox in the uſual way.

Of the other thirty, though the infection took place on their arms, ſo as to enflame them conſiderably, and to produce a very large prominent puſtule, with matter in it, on each of them, yet not one had any eruptive fever, or a ſingle ſubſequent eruption, on any part of the body; but about the eighth, in ſome the ninth, and in others the tenth day, the inflammation began to diſappear, and about the twelfth or thirteenth the puſtules on their arms ſcabbed off.

It is to be remarked too, that the matter which was in thoſe puſtules having been uſed to inoculate others, produced on them exactly the ſame appearances, unattended alſo with either fever or ſmall-pox. Notwithſtanding the *arms* of thoſe patients afforded the moſt indubitable proofs of infection, yet, as the conſtitutions of none of them appeared to have been infected by the ſuppoſed variolous poiſon, and it was therefore highly uncertain whether they were ſecure from future infection, it was thought right to inoculate the whole number again; accordingly five were inoculated from the natural ſmall-pox, and twenty-five from the artificial, but all with concocted matter, taken ſubſequent to the eruptive fever. The reſult was, that every one of them had the eruptive fever, and ſucceeding eruptions: in ſhort, they had the ſmall-pox in different degrees, but all in the uſual way of inoculated patients. It is very probable therefore, that the eruptive fever is a neceſſary agent to ſublimate the pocky matter into ſuch a degree of virulence as is requiſite to enable it to poiſon and infect the habit of the ſubject to whom it is applied; and though I do not mean to aſſert, that crude matter taken from the arm in the very early ſtate of this diſeaſe, will *never* produce the ſmall-pox; theſe experiments, however, are ſufficiently numerous to determine deciſively as to the very great uncertainty of its effects; and that, conſequently, the mere inflammation and puſtulary ſtate of the arm alone, at leaſt when produced by matter in this imperfect ſtate, may diſpoſe the patient to a dangerous confidence, as it is by no means a proof that he is ſecure from a future infection.

But to return. Whatever advantages may have been aſcribed to this ichorous kind of matter, certain however it is, that inoculation had been practiſed generally many years before this ſuppoſed ſecret of Mr. Sutton's was thought to be diſcovered, and all that time its credit had been ſupported by nothing but its ſucceſs. I have myſelf been converſant with inoculation near thirty years, during the whole of which time I have conſtantly uſed the concocted matter, and yet never had the misfortune of loſing more than one patient in my life, though I have inoculated a great many every ſucceſſive ſpring and autumn. Indeed I am inclined to believe that very little advantage ever aroſe from this trick; and that the great, nay, the only ſuperiority of the modern, or Mr. Sutton's method, over the old, conſiſts in keeping down the eruptive fever, by a free expoſure to the open air, and in being able, by means of the very ſlight razure of the ſkin, to judge with more certainty of the patient's infection, or to form, perhaps, a more probable gueſs at the future diſeaſe: whereas, in the infancy of inoculation, it was natural for practitioners, till they had been better taught by experience, to tranſplant their maxims from the natural to the artificial diſeaſe; and, among the reſt, they thought it neceſſary to keep their patients warm, and ſometimes even in bed during the eruptive fever; for errors rooted in long cuſtom, where reaſon could do but little towards the inveſtigation of truth, could only be cured by accident and experience. 'Till theſe laſt ſix or ſeven years, I followed the method generally in uſe, except that I always made the inciſion very ſlight, and was ſcarcely ever under any anxiety for a ſingle patient: however, from the latter period, as I ſaw the very evident uſe of keeping down the eruptive fever by cool air, I have given my patients the advantage of it, and have not had a ſingle one confined, unneceſſarily, an hour, by the diſorder; though, as I ſaid before, during the whole of my practice, in the old as well as modern method, I have invariably uſed matter in a concocted ſtate.

But, granting that the uſe of crude matter has any tendency to render the diſeaſe more favourable than in other modes of inoculation, ſtill we may be abſolutely ſure that it never can account for the great and ſtriking difference between the artificial and the natural diſeaſe; for this plain reaſon, becauſe, as we obſerved before, the former has always preſerved its character and mildneſs under every mode of management, and indeed with no management at all.

It has been ſuppoſed too, that the mildneſs of the diſeaſe ariſes from the very ſmall quantity of matter with which the conſtitution is poiſoned in every mode of inoculation, but more particularly in the modern. This reaſoning is founded upon a ſuppoſed analogy between the operation of the *pocky virus* and that of medicine on the animal œconomy, in proportion to the quantities of each received into the conſtitution. Conſtant experience, however, ſhews, that this reaſoning is more plauſible than true, and that it by no means affords an adequate ſolution of the difficulty. We frequently ſee in an infected family, eſpecially among the poorer ſort, a number of children attacked by the diſeaſe. If the *degree* of the ſmall-pox at all depended on the quantity of the infecting poiſon, thoſe who, out of a number of children, were the laſt infected, would have the diſorder with the greateſt ſeverity; for where they are obliged to breathe together in the ſame room, which is frequently the caſe with the poor, the latter ſubjects of infection muſt conſtantly have inhaled the morbid atmoſphere for days together; and, agreeably to this idea, the conſtitution muſt have been as it were ſaturated with the variolous poiſon before the eruptive fever comes on. However, the fact appears otherwiſe; for the ſubjects of the diſeaſe are indiſcriminately affected, and do not ſeem to be at all influenced by this principle. The firſt patient ſeized, whoſe illneſs may frequently ariſe from the ſlighteſt and moſt tranſient infection, will perhaps have a deadly ſmall-pox; while ſome of the laſt infected, though they have been conſtantly breathing the exhalations from a mere maſs of corruption, ſhall nevertheleſs have it in the moſt favourable manner. I have known infants who have been ſuckled by a mother under a mortal ſmall-pox, (where they have, conſequently, not only for a length of time together breathed nothing but infected air, but have been nouriſhed by the contaminated juices of the parent) yet paſs through the diſorder in the moſt benign manner.

THE *degree* of the diſeaſe, therefore, does not depend upon the *quantity* of the infecting matter.

FROM what has been ſaid, however, I would not be underſtood to deny the poſſibility of deriving *any* advantage, either from the benign character, or the ſmall quantity of the infecting matter, or from medicine, or from rules of regimen, or from the ſlightneſs of the inciſion, (on which likewiſe great ſtreſs has been laid) much leſs from the combination of them all; but this is quite certain, that as the ſalutary effects of inoculation, and the remarkable mildneſs of the diſeaſe produced by it when compared to the natural ſmall-pox, have been nearly the ſame in the abſence of ſome, and, ſometimes, even of all thoſe ſuppoſed advantages; no ſolution therefore of the difficulty before us can be drawn from any one, or all of the former conſiderations taken together.

THERE is indeed one diſcriminating circumſtance before hinted at, which uniformly attends the diſeaſe by inoculation, let it be performed, or the ſubject managed, in whatever manner it may; even though the patient be ever ſo much loaded with puſtules, or oppreſſed with the diſeaſe; and that is the general abſence of the *ſecondary fever*, that moſt formidable ſymptom ſo often fatal in the natural ſmall-pox. Indeed, if there is any one criterion by which the artificial diſeaſe is to be diſtinguiſhed from the natural, I think it is this exemption; for I do not remember in my practice to have met with it in a ſingle inſtance.

In order to diſcover then the real cauſe, or cauſes, which render this diſeaſe ſo mild under *every* mode of inoculation, in almoſt all caſes ſo very different from the natural ſmall-pox; let us take a view of the latter, and ſee whether, by phyſical analogy, we can inveſtigate the real cauſes of that dreadful variety it frequently affords; for though, as we obſerved before, its aſpect is ſometimes ſo mild as not to exceed the inoculated ſort, or even to give the patient notice of his own diſeaſe; yet at others it is complicated with a train of ſymptoms ſo horrible and deadly, as to leave him no more chance for his life than if he was poiſoned with the plague.

If by ſuch an inquiry, I ſay, we can develop the true cauſes of danger in the natural ſmall-pox, we ſhall moſt probably furniſh ourſelves with principles which will enable us to account ſatisfactorily for the abſence of them in the artificial diſeaſe, and ſhew the real cauſes of the ſucceſs of inoculation.

Previous, however, to our entering on ſuch an inquiry, it may not be amiſs to obſerve, that on *this ſubject* we can draw no certain data, nor eſtabliſh even a probable hypotheſis, from mechanic philoſophy; ſimple matter and motion are almoſt the only proper ſubjects of its ſpeculation, and conſequently, it is improperly applied to any others; particularly on medical queſtions, all reaſoning from mere mechanical principles, however plauſible it may at firſt appear, has at beſt been only a ſort of ingenious trifling, ſerving perhaps to amuſe the mind, but never producing one practical corollary.

In any complicated piece of mechaniſm, a repeating watch for inſtance, where nothing but matter and motion are concerned, when it happens to be out of order, goes irregularly, or perhaps ſtops; the mechanic, notwithſtanding a minute deſcription of the ſymptoms, or all the circumſtances attending the deficiency, and though he thoroughly underſtands its conſtruction, or perhaps made it, is yet frequently incapable of forming a probable gueſs at the cauſe, without taking it to pieces. How then is it poſſible, in an animal where the organization is infinitely complicated, and of which the groſſer parts only are even pretended to be underſtood; how, I ſay, can the phyſician, with mechanic preciſion, determine the cauſe of any diſorder which may ariſe in ſuch a multifarious and myſterious compoſition!

FURTHER; where the ſubject of diſquiſition is a *living animal*, compounded not only of an infinite variety of organized parts, but thoſe animated, and as it were ſpiritualized, by a vital principle pervading the whole, and which enters into, and is concerned in every diſeaſed, as well as every ſalutary proceſs of the animal œconomy; how much leſs poſſible is it for the philoſopher to eſtabliſh data from a principle totally beyond his cognizance,

zance, and conſequently from mere mechanic ideas, adequately to account for, or even form a rational gueſs at, the effects that any foreign agent may produce in it?

Such a ſubject of his inquiry is by no means adapted to the means of inveſtigation he is furniſhed with; theſe too in themſelves are very ſcanty and imperfect, and take in but a ſmall compaſs of information. His apparatus may ſhew him the weight or levity of the air, its degrees of moiſture or dryneſs, and its preciſe heat. He may take into the account too the direction and force of the winds, the tonic effects of north-eaſt, or the laxative qualities of the ſouth-weſt. But will any, or all of theſe, diſcover to him that myſterious ſpecific principle in things which ſhall at one time epidemically favour the production of the ſmall-pox, at another the meaſles; or affect one ſpecies of animals, horſes, bullocks, or dogs, for inſtance, with one common diſorder, while thoſe of another ſpecies are totally untouched? So far from it, that if the philoſopher was to reaſon fairly, and draw his concluſions *a priori* from the means of information he is poſſeſſed of, he would ſometimes prognoſticate diſeaſes which were never brought into exiſtence; and at others be ſurprized by the production of thoſe which apparently he had not the leaſt reaſon to expect.

Mortifying therefore as it is to the pride of reaſon and philoſophy, we muſt nevertheleſs be contented to draw truths, I mean medical ones at leaſt, from the records of experience and obſervation, which, in this reſpect, are the only true fountains of knowledge. It is from theſe alone, and from analogical reaſoning deduced from them, that we can ſecurely form concluſions to any uſeful or practical purpoſe.

Upon this ground then let us take a view of thoſe principles by which a ſubject for variolous infection may be influenced or affected at the time the diſeaſe commences; and theſe we ſhall comprehend under the four following conſiderations.

FIRST,

The HABIT OF BODY, *and* STATE *of the patient's conſtitution, at the time of infection.*

SECONDLY,

The QUANTITY *of variolous matter ſuppoſed to exiſt in the conſtitution at the time of the ſeizure*; or, in more general terms, and perhaps what will be found more conſonant to truth, *the* DIFFERENT TENDENCY *there is in the* SAME *body at* DIFFERENT TIMES *to be poiſoned by the variolous taint.*

THIRDLY,

The MANNER *in which the ſubject is infected, or the diſeaſe produced; either accidentally by contagion, or by an epidemic tendency.*

FOURTHLY, *and* LASTLY,

The ſalutary or malignant influence in the air, or external nature, at the time of infection.

SOME one of theſe conſiderations, or the combination of ſeveral, or all of them, will, I believe, at the ſame time that it furniſhes principles ſufficient to account for the great variety we ſee in the natural ſmall-pox, enable us likewiſe to underſtand clearly how the pernicious effects of them generally are, and almoſt always may be, avoided in the proceſs of inoculation.

AND firſt, of *the habit of body, and ſtate of the patient's conſtitution, at the time of infection.*

It does not appear that every taint in the conſtitution, or even the actual exiſtence of what is commonly called a bad habit, is unfriendly to this diſeaſe. We frequently find, in the natural ſmall-pox, ſubjects with what are uſually called ſcorbutic foulneſſes on the ſkin, and even very conſiderable ſtrumous complaints, who nevertheleſs paſs through the ſmall-pox ſo very favourably, as not to afford the leaſt reaſon for ſuppoſing that thoſe diſorders had any tendency to exaſperate it. I have at this time under my care four children in one family, three of whom have been always unhealthy, and perpetually ſubject to boils, ſcabby eruptions, excoriated ears, and every other ſymptom of foul and depraved juices. Theſe, however, have the natural ſmall-pox in a very mild, favourable way; at the ſame time that the eldeſt, a very healthy and clean-conſtitutioned boy, has ſuffered by it to a moſt ſevere degree.

In the artificial diſeaſe likewiſe experience evidently ſhews (whatever doubts there might have been in the infancy of inoculation) that thoſe taints in the conſtitution have ſo little to do with the peculiarities of this diſorder, that they are never any reaſonable objection to inoculation; for patients in thoſe circumſtances paſs through the diſorder in as kindly a manner, and with as few eruptions, as thoſe of the cleaneſt habit. I have inoculated a great number under ſcrophulous complaints and foulneſſes of the ſkin, without any inconvenience except, perhaps, a few partial puſtules invading the ſkin round the ſcabby parts; and as the ſeat of thoſe diſorders is uſually the ſurface of the body, (while the ſubject is otherwiſe in health, and the nobler parts are unaffected) a few additional puſtules are of no great conſequence.

The variolous poiſon is therefore a thing *ſui generis*, and no ways affected by thoſe taints of the juices, or what is uſually called a bad habit of body; or at leaſt ſo inconſiderably, as not to deprive ſuch patients of any of the advantages of inoculation, or now to deter experienced practitioners from performing the operation upon them.

But if the ſubject attacked with the diſeaſe is of an athletic conſtitution, with ſtrong tenſe fibres, and a denſe blood; if he has fed high; if his veſſels are full, and the firſt paſſages loaded with foul matter; and what is worſe, if, when the body is poiſoned by the variolous virus, the patient, before he has even notice of his diſeaſe, happens to have over-heated himſelf by exerciſe or debauch; if, I ſay, the inflammatory tendency in ſuch a conſtitution is heightened by this ill-timed irregularity, and perhaps further increaſed by the preternatural heat of the bed, we cannot wonder if the variolous fever is violent, and of courſe productive of all the miſchiefs of which an exceſs of it is capable. A rapid, tenſe pulſe, ſhort and laborious breathings,

ings, great heat and thirſt, a dry and foul tongue, with violent pains in the head, back and loins, are the natural train of ſymptoms ariſing from ſuch a ſtate of things: and how far the degree of the eruptive fever, in this aggravated ſtate of it, is inſtrumental in increaſing the conſequent eruption, and loading the conſtitution with variolous matter, I ſhall ſhew hereafter.

If, on the other hand, the conſtitution of the patient is under the influence of the contrary principles, either from antecedent acrimony in the blood, or ſome unaccountable depravity in the animal œconomy, which diſpoſes the fluids and ſolids to ſolution and rottenneſs; under theſe circumſtances,

cumſtances, we may be ſure that the eruptive fever, ſupervening upon ſuch a ſtate of nature, will heighten the putreſcent tendency, and produce puſtules of a very unfavourable kind. As this ſtate of the conſtitution is the reverſe of the inflammatory, (which, however, ſometimes terminates in the ſame way) we cannot be ſurpriſed by a crude indigeſtible pock, petechiæ, black and livid ſpots and hœmorrhages, the natural conſequences of a diſſolved craſis of the blood.

WITHOUT deſcending therefore into the minutiæ of other differences in conſtitution, or meddling with doubtful diſquiſitions, we ſhall content ourſelves with having obſerved, that patients of either of the two laſt deſcribed habits ſtand more than a probable chance of being ſeverely dealt with by the diſorder; equally removed as they are, though at different extremes, from that genuine and unoppreſſed ſtate of health which is properly calculated for combating with, or ſucceſsfully carrying on the proceſs of any diſeaſe.

SECONDLY; let us conſider how far patients under the above, or other circumſtances, may be affected by the next fountain of miſchief, viz. the *different degrees*, or *uncertain quantity of variolous matter exiſting in the conſtitution at the time of infection*; or, in other words, by the *different tendency* there is in the body itſelf at *different times* to be *poiſoned* with the variolous matter.

THAT different quantities of matter are produced in different ſubjects in the proceſs of the diſeaſe, we find true in fact, by conſtant and woful experience; and there is likewiſe the ſtrongeſt reaſon to believe that, previous to infection, the quantity of the variolous matter, or rather that principle in the conſtitution which eventually produces it, *ebbs* and *flows*, is more or leſs vigorous at different times in the *ſame* ſubject under a various combination of circumſtances.

WE ſee at one time a perſon expoſed to all the natural means of infection: he ſhall viſit the ſick-room of people under the diſeaſe, breathe in the morbid atmoſphere, or perhaps ſleep in the ſame bed with them; and yet all this, nay, even inoculation itſelf, ſhall not produce the diſeaſe in him. On the contrary, at another time, the very ſame conſtitution will, as it were, take fire of itſelf, and, without any apparent preceding cauſe, be infected with the diſtemper. And indeed the inſtances are by no means uncommon, where the patient who has withſtood at one time all the ordinary means of infection; nay, who has induſtriouſly, but ineffectually, ſought it; yet at another has had a ſmall-pox ſo malignant in appearance and effect, that the whole body was converted into an offenſive variolous putreſcence. Indeed, were it not true that there is in the conſtitution itſelf, if the ſame ſubject, this different propenſity to be poiſoned; or, in other words, that the conſtitutional principle which produces the pocky matter doth actually ſuffer an increaſe and diminution of vigour, it would be ſcarcely poſſible to conceive why, when the ſmall-pox is epidemic, any one not paſſed the diſeaſe ſhould eſcape. From whatever cauſes, however, this propenſity may ariſe, there is great reaſon to ſuppoſe that the increaſe or decreaſe, the ebb or flow of this principle, may reſpectively take place according as the ſmall-pox is epidemic, or not. For the very idea of an epidemic is one and the ſame morbid ſtate of animal bodies produced, or at leaſt conſiderably promoted, by the occaſional operation of ſome general and external cauſe; and therefore, before the ſmall-pox can rage epidemically, it muſt be at leaſt greatly encouraged by the influence of ſome ſpecific principles then ſubſiſting in the ſtate of external nature, which operate upon, and diſpoſe the body to infection. So that when we ſee the ſmall-pox epidemic, it may with great probability be concluded, that though the diſeaſe may not actually be produced in every one that has not paſſed it, yet that the human conſtitution is then more particularly diſpoſed to, or ripe for, the infection.

But whether the degrees of this variolous principle depend ſimply upon the ſtate of the air, or ſome peculiarities in the conſtitution ariſing within itſelf, or are the reſult of a combination of both; which ever of theſe is ſuppoſed, there is the greateſt reaſon to believe, if we may ſafely draw any concluſions from phyſical analogy, that the aptitude to infection in the ſame ſubject keeps pace with the ſeveral degrees of this principle; that is, when the conſtitution is moſt fraught with variolous matter, that then it is moſt diſpoſed to be poiſoned or infected. During the continuance of any contagious epidemic diſeaſe, we always find that thoſe conſtitutions which are moſt congenial with that character, are peculiarly obnoxious to the correſpondent diſtemper. Thus, in a ſtate of air which is productive of putrid fevers, all thoſe ſubjects whoſe ſolids are yielding, looſe and flaccid, and where the blood has a propenſity to run into a diſſolved ſtate, are always very ſuſceptible of infection, and eaſily fall into the putrid diſeaſe of the time. When the malignant ſore throat raged, ſtrong robuſt men, with tenſe fibres and denſe blood, might, and did, ſafely expoſe themſelves to the greateſt contagion, without any riſque of receiving the infection; whereas to young children, women, and even men of very delicate habits, the riſque of infection was almoſt reduced to certainty, (on the firſt breaking out of the diſeaſe) if ever they inhaled the contagious atmoſphere ſurrounding the ſick.

In whatever manner it is that the contagious particles proceeding from a diſeaſed ſubject infect and ſo far contaminate the juices of the conſtitution to which they are applied, as to convert them into their own depraved nature; or however it comes to paſs that perhaps moſt diſeaſes have, more or leſs, a tendency, in common with almoſt every thing elſe in nature, to produce their like, and propagate their being; certain it is, however, that the operation of this principle muſt be in proportion to the degrees of congeniality ſubſiſting between the agent and the ſubject of its influence; and we may therefore conclude, that when the conſtitution of a perſon not paſſed the ſmall-pox is moſt ſaturated with the variolous principle, he is then more particularly ſubject to infection.

But though there cannot be the leaſt doubt that the variolous principle ſubſiſts in the conſtitution of perſons not paſſed the ſmall-pox, and it is highly probable that the vigour of this principle varies at different times in the ſame ſubject, ſo as eventually of itſelf to produce a greater or leſs quantity of puſtules; yet I am far from thinking that no part of the variolous matter, that may make its appearance in the courſe of the diſeaſe, could be owing to any other cauſe; or that the whole of it neceſſarily exiſted in this principle *prior* to the eruptive fever, and *antecedent* to the whole variolous proceſs. This notion, I am convinced, is not founded in truth, though it doth not want plauſibility, and is indeed the foundation of that ſyſtematic kind of reaſoning of which the phyſical world has been very fond, and on which the doctrine of critical periods hath been principally built. Here therefore, though it is not abſolutely neceſſary to the preſent argument, yet, as it bears ſome relation to it, and may furniſh us with important practical indications as to the actual quantity of variolous matter produced in the proceſs of the diſeaſe, I ſhall beg leave to examine into the probability of this opinion.

In this view of things then, a fever is conſidered as a ſalutary agent of nature, abſtractedly inoffenſive in itſelf, and eſſentially neceſſary to convert the morbid ſtate of the juices into a proper condition for the purpoſes of the animal œconomy; as a kind of chemical proceſs, where, in analogy to the fermentation of any fluid, the agitation continues till (if the patient's ſtrength can laſt out the ſtruggle) the morbid matter being forced off in a critical diſpumation through ſome of the excretory ducts, the conſtitution is ſwept clean from the evil that poiſoned it, and the animal, at the expence of great fatigue, and conſequent weakneſs, recovers its health. The reaſoning of this hypotheſis, I ſay, proceeds upon the ſuppoſition, that the *whole* of the poiſon, or matter, which makes its appearance on the future critical termination of a diſeaſe, and which is ſo offenſive to the principles of life, exiſted in the conſtitution *prior* to, and ſo far independent of, the fever, that if the patient miſcarries, he dies not of the viſible fever, (which is in truth an aggregate only of external ſymptoms, ſuch as rapid circulation, great heat, thirſt, dry tongue, &c. none of which, abſtractedly conſidered, have any mortal tendency) but of this internal poiſoned ſtate of the juices, which is inviſible, and no way cognizable by our ſenſes, but from the fever that it produces.

In this manner of conſidering the proceſs of an acute diſeaſe in the animal œconomy, the phyſician has little elſe to do beſides occaſionally reſtraining its violence, or exciting it in a ſtate of languor; but, with a patient ſuperintendance, to wait the termination of the fever, either by a ſalutary criſis, or death. For in this ſtate of things, any attempt towards the removal of the fever itſelf, or the ſuppreſſion of this proceſs, and whatever means may be propoſed for this purpoſe, muſt reſult from the moſt ignorant quackery; or if they do ſucceed, muſt owe their ſucceſs to principles quite foreign to this view of the matter.

But happily for us, we do not always *act* conſiſtently with our ſpeculative opinions. However fond we are of paying compliments to our own ſagacity, an honeſt man will not ſacrifice his patient to his vanity by a tenacious adherence to a favourite theory, when it doth not ſquare with experience; but will preſcribe and uſe for his patient any means of recovery that has had the ſanction of actual ſucceſs. If he can cut the diſeaſe ſhort, and cure his patient quickly, though it is by the deſtruction of this febrile proceſs, (which, upon the above principles, he ought to conſider as ſacred and inviolable) he will not refuſe the ſucceſsful aid and free uſe of the lancet, nor even a doſe or two of James's Powder, or any other antimonial.

Now, to conſider this matter a little more cloſely. In fevers of the putrid character, whether they owe their riſe to a putreſcent ſtate of the fluids, incomprehenſibly produced in a vitiated habit, or are ſuperinduced by morbific contagion; or, by a malignant epidemic influence in the air; or by a combination of foreign circumſtances; in this ſpecies of fever, I ſay, the above ſyſtematic doctrine is not ſo ſpeciouſly founded: for though a previous acrimony or ſolution of the blood may, as it were, ſtimulate the vital powers of the animal into preternatural exertions, and raiſe a fever in order to reſtore the ſalutary ſtate of the fluids; yet we know by experience, that the very fever itſelf will produce, or at leaſt aggravate, this vitiated ſtate of them, which, upon the preſent ſuppoſition, it was deſigned to cure; for a violent rapid circulation, and the ardent heat attending a very ſmart fever, will moſt certainly increaſe the diſpoſition to putreſcence; and even diſeaſes which, in their early ſtages, (from the ſizy ſtate of the blood) were not of an inflammatory caſt, yet, by the continued ardour of the fever, frequently become putrid.

Here then we ſee *cauſe* and *effect* (as they frequently, indeed moſt generally, are in phyſical matters) ſo nearly allied, that ſuppoſing a pre-exiſting ill ſtate of the fluids to cauſe the fever, yet the effect ſo far operates backwards upon the cauſe, as to increaſe the evil it was intended to remedy.

Accordingly, indications have been drawn from diſeaſes of this claſs, for a practice of two different kinds; the one uſing alexipharmic or antiſceptic medicines, where the phyſician directs his attention to the ſtate of the fluids, as the cauſe of this fever; and the other giving cooling refrigerating medicines adapted ſimply to the fever itſelf. And it is well worth obſerving what Dr. Dover aſſures us of, even in the plague itſelf, that out of an hundred and eighty who were ſeized with it at the ſiege of Guaiaquil in South-America, no more than ſeven or eight died; and that this ſucceſs was owing to very large bleedings, even to an hundred ounces a man, together with free dilution by cooling acidulated fluids. And Sydenham and Mead both give their ſanction to the ſame practice in the early ſtages of the plague.

But in every ſpecies of the *eruptive* fever, this ſyſtematic doctrine has much fairer pretenſions to our regard; and the appearances in the ſeveral parts of the diſeaſe concur in giving it a greater air of probability, from the ſmall-pox, meaſles, &c. down to the nettle-raſh. In the ſmall-pox, for inſtance, when we ſee the conſtitution labouring under every mode of oppreſſion, a violent fever brought on, and nature in an univerſal ſtruggle; and on the appearance of a number of little boils, obſerve all this fever, hurry and tumult, in the conſtitution, ceaſe; and moreover, at laſt ſee thoſe puſtules maturate, ſcab, and dry off; I ſay, after ſuch an apparent cauſe of this train of effects, we plauſibly conclude that the *whole* matter lodged at laſt in the puſtules, or at leaſt the ſources from which it was derived exiſted in the conſtitution prior to, and independent of, the fever, which is conſidered as no other than the agent of nature to expel the poiſon.

BUT rational as, at firſt ſight, this opinion may appear, there is great reaſon to believe that it is not wholly founded in truth. The ſmall-pox, in its genuine ſtate, is truly a diſeaſe of an inflammatory kind; and we know by experience, that as inflammation will produce fever, ſo fever will at leaſt increaſe inflammation. In the pleuriſy, peripneumony, or any other conſiderable inflammatory diſorder, we are almoſt at a loſs to ſay what is cauſe, or what is effect; but be that as it may, of this we are certain, that cauſe and effect are ſo intimately connected, that the latter never fails of re-acting ſo upon the former, as to ſeem almoſt coeval with it. If pain and the conſequent inflammation produce fever, the latter, though merely ſymptomatical, operates backwards immediately upon its cauſe, and increaſes the inflammation. On the other hand, if the fever is ſuppoſed to be the primary cauſe, as producing inflammation; yet pain, the neceſſary concomitant of the latter, will ſymptomatically increaſe the former. And, in conſequence, we find that the ſucceſsful methods of cure are equally adapted to the diſeaſe under both thoſe conſiderations. For as by antiphlogiſtic, refrigerating medicines, and more particularly by large bleedings, the veſſels of the patient are ſo far ſlackened, as to make it almoſt impoſſible for nature to form or continue an inflammation; ſo, at the ſame time, no method of treating it can be better adapted to the cure of the fever.

In the variolous fever likewiſe, we cannot be ſure whether the whole of the poiſon which makes its appearance in the future proceſs of the diſeaſe, exiſted in the conſtitution prior to the eruptive fever; or whether the agency of fever is not of ſuch a nature, as if not to generate, at leaſt conſiderably to increaſe it, by aſſimilating the juices of the conſtitution into the nature of the variolous poiſon. All that we can conclude upon with certainty is, that there is a variolous principle, a kind of nidus, a ſpecific ſomething, exiſting in the conſtitution of a perſon who has not paſſed the ſmall-pox, which ceaſes in one that has; that the application of the poiſon to the ſubject ſets this principle in action by the agency of fever; (which is indeed an inſeparable and eſſential part of the diſeaſe) but there is no more reaſon to conclude that the matter actually generated in the ſubſequent proceſs exiſted independent of that fever, than there is to conclude that ſalt of hartſhorn, as a volatile ſalt, exiſted in the horn of the ſtag prior to, and independent of, the agency of the fire concerned in the proceſs of making it.

Whoever has been converſant with the preſent manner of conducting the diſeaſe under inoculation, in the way Mr. Sutton has introduced, of ſuppreſſing the eruptive fever by an expoſure of the patient to the cold of the open air, cannot doubt of the fever's being a very conſiderable agent in the increaſe of the pocky matter. Indeed nothing but the ſtrongeſt preſumption of this from real experience could have induced practitioners to have adopted this method, which, at firſt ſight, combated, and ſeemed totally inconſiſtent with all their ſyſtematic notions. For, beſides the ſeeming impropriety of indiſcriminately expoſing to the ſeverity of the weather all conſtitutions, as well the delicate as the robuſt, was it likely, upon the ſuppoſition of the exiſtence of the whole variolous matter prior to the feveriſh alarm, that the keeping down, and, as it were, ſtifling this ſuppoſed agent of nature, apparently calculated (upon the former ſyſtematic hypotheſis) for ſweeping the conſtitution of the morbid miaſmata, which would otherwiſe poiſon the blood, and all the juices ſecreted from it; was it likely, I ſay, that this ſhould be found a ſucceſsful mode of practice? or was it poſſible indeed that any thing but the actual and conſtant advantages ariſing from this practice could have cauſed it to be almoſt univerſally adopted, and diſpoſed the world to make a ſacrifice of a theory ſo plauſible, apparently rational, and long eſtabliſhed?

ACCORDINGLY we ſtill find ſome few practitioners, and the bulk of the people in general, always urging their ſuſpicions, that by ſtifling the eruptive fever, (and, in conſequence, leſſening the eruption) the criſis is rendered incomplete; that the conſtitution is not ſufficiently ſwept from the variolous poiſon which pre-exiſted in it; that we are to expect ſucceeding complaints, or chronic miſchiefs, ſome time or other, reſulting from a foul poiſoned ſtate of the juices. And indeed ſo ſtrong are the prejudices of the world, and ſo difficult is it to eſtabliſh a truth (even though well ſupported by experience) when it contradicts our favourite habitual maxims, that numbers of people are uncandid enough to aſcribe every complaint or diſorder in the habit of the inoculated patient, for years afterwards, merely to this circumſtance, though the truth, in fact, is quite otherwiſe: for we ſcarcely ever ſee theſe miſchiefs produced in the habit by inoculation, that we do by the natural diſeaſe; ſuch as obſtinate opthalmise, and numberleſs other complaints ariſing from a foul ſtate of the juices. Nor, if we conſider the matter ſpeculatively, is it likely to be otherwiſe than it is really found. For it is not reaſonable to ſuppoſe that the conſtitution, or animal juices, ſhould be ſo much injured or depraved by ſo ſlight a diſeaſe as the inoculated ſmall-pox almoſt always is, as (what we frequently ſee in the natural ſmall-pox) when the whole body is converted into a general putrefaction, and a nauſeous maſs of corruption.

FREQUENTLY indeed the eruptive fever is ſo very ſlight under inoculation, that it is ſcarcely cognizable to the practitioner by the pulſe, or any of the uſual ſymptoms; nay, the patient himſelf is hardly ſenſible of it: in this caſe the ſucceeding eruptions are ordinarily very ſlight, and the diſeaſe paſſes off very mildly. But if the ſymptoms of the eruptive fever run high, if the tendency to ſhiver is pretty conſiderable, and the head is giddy, or much oppreſſed; if there is great languor, liſtleſſneſs, or laſſitude, and averſion to motion; and if, in conſequence of all this, the patient's inclination to the fire-ſide, or, what is worſe, the bed is indulged, we find by conſtant experience that the fever is increaſed, and all the ſymptoms aggravated. On the contrary, when the patient under thoſe circumſtances is moved into the free air, and feels its refrigerating effects on his body, the feveriſh diſorder ſubſides, the head is leſs heavy, the ſpirits leſs oppreſſed, and the powers of enjoyment return. This continues as long as he walks, or is carried abroad; but when the time for ſleep arrives, the heat of the bed never fails to aggravate all thoſe complaints; and, after his paſſing a hot and reſtleſs night, with an increaſed pulſe, fluſhes in the face, and ſhort ſlumbers perpetually diſturbed by ſtartings, you find your patient in the morning ſo ſtupidly heavy, oppreſſed, and indiſpoſed to motion, that it is always with difficulty that he (or the by-ſtander, if it is a child) can be perſuaded to believe it neceſſary he ſhould get up, and be carried into the open air; yet, as certainly as he is removed into it, he never fails to feel the good effects of it, by the ſubſiding of the fever, and the almoſt total removal of all the conſequent complaints with which he was ſo much oppreſſed.

And here I cannot help obſerving, that there is perhaps no agent ſo effectual and expeditious in keeping down the fever, and cooling the whole maſs of matter of which the body is compoſed, as this ventilation by an expoſure to the air in gentle motion, more efficacious than refrigerating fluids taken into the ſtomach, as they ſoon acquire the heat of the body; for that portion of the circumambient air which is in contact with the body, and which, in a quiet ſtate, would be gradually warmed by the heat of it, is momentarily bruſhed off by continued ſucceſſive applications of freſh and cold air to the ſurface: this we ſenſibly perceive in the familiar experiment of the common fan. At firſt ſight, indeed, the cenſures paſt on Mr. Sutton's conduct by the judicious part of mankind, for indiſcriminately expoſing all ſubjects equally, whether the tender or thoſe brought up hardily, even to the ſeverities of the weather, ſeemed to be very rationally founded; for it was natural to ſuppoſe that the delicate might frequently increaſe the original diſeaſe by the ſuperadded miſchiefs of a cold. However, this criticiſm, though familiar to every body's mouth, is more plauſible than true; for when a fever is once begun, be it natural or artificial, either from the conſtitution or inebriation, the perſpiration is not ſubject to thoſe ſuppreſſions which we ſuppoſe productive of the diſorder we call a cold; and I believe, on recollection, we ſhall ſcarcely remember an inſtance of it under the actual duration of the fever, whatever might be its cauſe.

From the time the eruption makes its appearance, the fever begins to ſubſide; and when the former is complete, that is, when the variolous fever has aſſimilated into the nature of the variolous poiſon ſuch juices of the conſtitution as are, with that degree of fever, ſo convertible, the febrile proceſs ceaſes.

In this ſtate of the diſeaſe, however, when the intereſting period is over, and the iſſue of the diſorder is apparently ſecure; if yet, by injudicious management, the variolous fever is revived, be it by heating medicines, animal food, or vinous liquors, we ſometimes ſee, in oppoſition to the idea of the pre-exiſting morbid miaſmata, that *more* pocky matter is formed by it, and a great number of puſtules produced, which would never have exiſted but for this cauſe, and without which there was every reaſon to conclude the former eruption completely critical. Many inſtances of this ſort I have ſeen myſelf; and though I am ſure they muſt frequently have occurred to practitioners in this buſineſs, yet, in order to put it beyond a doubt that conſtitution or inebriation, the perſpiration is not ſubject to thoſe ſuppreſſions which we ſuppoſe productive of the diſorder we call a cold; and I believe, on recollection, we ſhall ſcarcely remember an inſtance of it under the actual duration of the fever, whatever might be its cauſe.

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Mrs. H---n, a lady in this neighbourhood, was ſome years ſince inoculated by Mr. Sutton; and as ſhe was a woman of fortune, and exceedingly fearful, prevailed upon him, by a very conſiderable fee, to reſide in the houſe during the whole proceſs. The infection took place; the eruptive fever began, and, in a very moderate manner, continuing the uſual time, was ſucceeded by a kindly number of puſtules;

tules; on the complete eruption of which, the fever totally vaniſhed, and all ſolicitude for the iſſue of the diſeaſe was at an end. The puſtules, however, being few in number, though very fair and large, were not ſufficient to quiet the lady's ſcruples; and indeed we frequently find it very difficult to calm the patient's fears on one hand, and to gratify their wiſhes on the other. And this lady, it ſeems, did not believe, or at leaſt thought ſhe could not be ſure, that the conſtitution would be ſo thoroughly freed from the variolous poiſon by ſo moderate an eruption, as to be ſecure from future infection, or the miſchiefs of an imperfect criſis. Theſe fears the lady expreſſed while ſitting at table with Mr. Sutton, *three days* after the ſmall-pox had made their appearance, and the *eruptive fever* had, in appearance, *totally* ceaſed. The latent embers of the variolous fever were not, however, ſo entirely extinguiſhed, as to be paſt rekindling. Mr. Sutton told her, that if ſhe much wiſhed to have a greater number of puſtules, there was a certain way of procuring herſelf that ſatisfaction; as ſhe had nothing to do but to dine upon the hare, then on the table, and to drink a glaſs of wine. She accordingly purſued the hint, eat of the hare, and drank a glaſs of wine. Some hours after ſhe grew hot and feveriſh; her head ached and throbbed exceedingly; and, after a very reſtleſs night, the next morning diſcovered the whole ſurface of her body covered over with ten thouſand eruptions; ſo thick indeed, that there were ſcarcely any intervals.

Not only the patient, but the doctor was now alarmed; and he could not help expreſſing his fears, by deſiring that a phyſician might be ſent for, as he would not undertake the conduct of ſo formidable a diſeaſe. Dr. Calwell was accordingly called in, to whom Mr. Sutton diſcovered the moſt anxious concern for the fate of his patient; of which indeed he could not give a ſtronger proof, than that of making a ſacrifice of his intereſt to his humanity, by diſcloſing to the phyſician the nature of the preparative medicines which he had given; as he did not know, he ſaid, but that an information of that ſort might be neceſſary

ceſſary to determine his practice. He confeſſed ſhe had taken nothing but calomel and antimonial preparations; told him the cauſe of this alarm; and added, that though he very well knew how to conduct a patient through the proceſs of inoculation, he did not however pretend to any particular knowledge in the natural ſmall-pox, or chuſe to truſt to his own judgment in ſo alarming a ſtate of the diſeaſe.

The ſmall-pox, though exceedingly numerous, was yet of the diſtinct kind; the ſymptomatic febrile exacerbations, in the progreſs of the diſeaſe, were occaſionally calmed by the evening anodyne; and no ſecondary fever ſupervening, the lady paſſed through the diſeaſe in a more kindly way than could have been expected in thoſe circumſtances.

On conſidering this caſe, can there be a doubt but that this ſecond eruption, and the great quantity of variolous matter which made its appearance after the tranquillity re-eſtabliſhed in the conſtitution, was not only wrought up, but actually generated by the rekindled fever. To what elſe ſhould it be owing? The fleſh-meat and wine could no more create this matter then, than it could have done it a month before or after; nor is it poſſible to ſuppoſe, that this ſecond load of poiſon ſtill remained in the habit after the firſt criſis, as there was not between the decline and revival of the fever a ſingle ſymptom of ſuch a poiſon in the conſtitution.

INDEED we ſee the ſame analogy in the peculiar ſpecific nature of ſome other fevers. In a fit of the gout, for inſtance, there is ſometimes a ſmart fever, always a feveriſh habit, accompanying it; and we ſcarcely know which is the primary diſorder, the gouty matter, or the fever: however, if the former is ſuppoſed, the fever once begun certainly increaſes the poiſon.

EVERY gouty proceſs may be divided into ſo many diſtinct paroxyſms. After a feveriſh and very painful night, the patient will be ordinarily tolerably cool, his pulſe calmed, and his pain very conſiderably abated in the morning: and again, on the approach of night, the never-failing feveriſh exacerbation will always produce a return of the gouty torment.

Now, after a kindly, but ſmart fit of the gout, which has perhaps laſted two or three months, and has viſited, and at laſt taken a regular leave of all the extremities, with every appearance of a complete criſis; we ſhall very probably conclude with Dr. Cadogan, that the conſtitution is cleared up, the gouty matter which rouſed the fever fairly eliminated, and the blood or juices reinſtated in their original purity; and that therefore a ſubſequent accumulation of gouty matter in a great meaſure depends upon our own conduct.

THIS is all very plauſible; but the misfortune is, that actual experience ſtubbornly oppoſes this theory; for if this very patient, whoſe conſtitution is ſuppoſed to be thoroughly ſwept by the gouty proceſs, ſhould unfortunately take cold on his firſt appearance abroad, ſo that the feveriſh habit is generated anew, he ſhall be a ſecond time ſeized with his gouty complaints, and be again tormented with a repetition of the ſame pains, which frequently do not terminate but with a fit as long and as obſtinate as the former. Whence then comes this freſh acceſſion of gouty matter? not from gradual accumulation ſurely; there has been no time or funds of irregularity for it; nor have we any reaſon to imagine (from the acknowledged regularity or complete termination of the former fit) that this quantity was left in the habit.

The ſame reaſoning holds good in, and is confirmed by, many other fevers. To inſtance the miliary, in which every feveriſh relapſe is conſtantly followed with a freſh crop of eruptions; and as the old method of conducting this diſorder was that of keeping the ſkin conſtantly ſoaked in ſweat, ſuch an exquiſite tenderneſs and ſenſibility to cold was ſuperinduced in the reeking patient, that after the firſt fever ſubſided, it laid the foundation of repeated colds, with their ſucceſſive fevers, and conſequent eruptions, which were frequently not terminated but with the life of the patient.

From the foregoing facts and reaſoning I think we may fairly draw the following concluſions. Firſt, that the variolous, gouty, and indeed many other fevers, have in common a real, though inexplicable property of increaſing at leaſt, if not generating, a matter ſimilar to that which gave them being. Secondly, that therefore this agency of fever, though, in a *primary* view, neceſſary, yet, by encouragement, may become *ſubſequently* miſchievous, and increaſe the evil it was intended to remedy. And laſtly, that a free expoſure to the cool refreſhing influences of the open air in the variolous fever, does effectually and inoffenſively, by reſtraining its violence, leſſen the diſeaſe; not (as vulgarly ſuppoſed) by ſuppreſſing the pocky matter, but by preventing the further and undue generation of it.

I CANNOT diſmiſs this part of my ſubject without juſt obſerving, how very extraordinary it is that a man of Dr. Sydenham's judgment, and poſſeſſed of a mind ſo well calculated for diſcovery, ſhould not have carried his own convictions further into practice. He ſeems ſo thoroughly convinced of the utility of the expoſure to cold in the ſmall-pox, even in an advanced ſtate of the diſeaſe, that he recommends it as the moſt certain, if not the only, way of reſtoring the ſwelling of the face when there has been a ſudden receſſion of it. Nay, he further mentions an inſtance of a patient, who being apparently dead and laid out, was yet recovered by the cold. But notwithſtanding all this, his principle no farther influenced his practice than in the inſtance above-mentioned, in recommending the patient only to no confinement in bed during the eruptive fever, and now and then ventilating the room with a little freſh, to bruſh off the foul diſeaſed air. Perhaps, had not his practice been influenced and cramped by the dread of perſecution from his antagoniſt, the famous champion for the warm regimen, Dr. Morton, he might have deprived Mr. Sutton of an honour which candour and impartiality muſt now acknowledge to be his due.

But to return from this long, tho', I truſt, not uſeleſs digreſſion, (as it affords very conſiderable practical indications) and go on with the ſecond general conſideration, viz. the different tendency there is in the *ſame* body, at different times, to be poiſoned by the variolous fomes.

AGREEABLY to what has been ſaid, we find that, during the epidemic tendency, ſubjects not paſſed the diſtemper are more open to contagion than in other conſtitutions of air when the ſmall-pox is not epidemic, and is conſequently a rare diſeaſe. Inſtances are very common, where ſubjects, who have eſcaped infection even from inoculation, as well as many other means of contagion, yet, on removal into a ſituation where the ſmall-pox has been epidemic, have preſently after been ſeized with the diſorder. Indeed events of this kind are ſo common, as to have given riſe to a vulgar, but ill-grounded opinion, that any change of air is hazardous to thoſe who have not paſſed the ſmall-pox.

As, however, it is very certain that there is in the ſame ſubject, at different times, this different propenſity to be poiſoned; and as it is moſt probable alſo that this promptitude to infection is in proportion to the degrees of the variolous principle; I ſhall conclude this ſection by obſerving, that if the firſt-mentioned ſubject, viz. one of a highly enflamed conſtitution, ſhould chance to be ſeized with the ſmall-pox at the time that the conſtitution is unhappily ripe for the production of it, we may well ſuppoſe that this conſideration, ſuperadded to the former, at the ſame time that it produces a diſeaſe, formidable by all the concomitant ſymptoms of violent inflammation, will render it ſtill more dangerous by a load of variolous matter. The ſmall-pox may poſſibly be of the diſtinct kind, (for I apprehend the diſtinguiſhing character of the confluent depends upon another circumſtance) but there is every reaſon to fear the patient will have a hard ſtruggle for his life.

In the ſecond ſubject, viz. that of a putrid character at the time of infection, at the ſame time we are prepared to expect a train of deadly ſymptoms, ſuch as flat and pale puſtules filled with an indigeſted ſanies; livid ſpots perhaps, and all the concomitants of a putrid diſſolved ſtate of blood; we cannot, I ſay, be ſurpriſed to find his diſtreſs heightened by a habit ſaturated with variolous poiſon.

HAVING ſeen, in this ſecond ſection, what effects a *propenſity* to the diſeaſe, or a *diſpoſition* in the body to be *poiſoned* by the variolous fomes, may have upon the ſmall-pox which is to be produced; and how much the danger of the diſeaſe may be heightened by the *concurrence* of this principle with that malignity of the conſtitution which has been mentioned in the firſt article; let us now conſider how far the malady is ſtill capable of aggravation by the third ſource of miſchief, viz.

THE *manner* in which the ſubject is
nfected, or the diſeaſe produced, either
y accidental contagion or an epidemic
nfluence.

DR. MEAD is of opinion, that the
ir of this climate never produces the
lague, ſmall-pox, or meaſles, as the
wo latter were never known in Eu-
ope till the Moors entered Spain;
nd that they were afterwards propa-
ated and ſpread through all nations,
hiefly by means of the war with the
aracens. Dr. Arbuthnot is of a con-
rary opinion: he, from a train of
eaſoning, concludes that the plague
tſelf may be produced or generated by
ome malignant quality in the air,
ithout any contagion.

Which of theſe opinions is true, I will not take upon me to determine; but I cannot help remarking, that every ſpecies of contagious diſorders muſt have had its origin or firſt exiſtence from cauſes prior to all contagion, without which it could never have begun to be, or its original generation have been conceived. And as all theſe ſeveral diſorders (particularly the ſmall-pox and meaſles) do often rage violently in this climate, it is contrary to the analogy of nature to ſuppoſe that a conſtitution of things, ſo calculated as frequently to ſupport them in full vigour, ſhould not be capable of bringing them into being. Be this true or not, if thoſe diſeaſes are conſidered as exotics, and it is therefore concluded that they always produce their effects in this climate by contagion; it is however moſt probable, if not quite certain, that this principle is ſometimes ſo exceedingly languid and inefficacious, that it requires the agency of other cauſes to give it activity, ſo as to produce general effects, or the tribe of diſeaſes to which it belongs, and which without this agency, therefore, would never again be brought forth.

INDEED it is not probable that the ſimple principle of contagion can exiſt, or be capable of producing active miſchief, after remaining without effect for ſo great a length of time as it ſometimes does; for we ſee large towns, and very conſiderable tracts of country, totally without the ſmall-pox, and that for a great while together; at another time, we ſhall, without being able to trace any agency of contagion, ſee it begin to make its appearance, increaſe, and rage violently; and then again gradually decline, though all the ſubjects for the diſeaſe are not infected; and though the principles of contagion, which have acquired their utmoſt force and virulence, and might infect them, remain in houſes, furniture, and many other fit repoſitories for the variolous poiſon.

From theſe conſiderations I think we may ſafely conclude, that though the ſtrongeſt epidemic tendency may not in Europe generate or create this diſeaſe without the concurrence of a contagious fomes; yet that there is by the agency of the former ſuch an alteration made and propenſity brought on in the animal juices, as is eſſentially neceſſary to continue the exiſtence of the diſeaſe.

VARIOLOUS contagion, when it exerts its influence upon the ſubject of its operation, produces its effects by the actual application of its poiſon, either externally through the medium of the ſkin; or internally to the gullet, ſtomach, and guts, in the act of deglutition; or, laſtly, to the lungs in the act of reſpiration.

THAT the pores of the ſkin are poſſeſſed of very conſiderable abſorptive powers, analogous to thoſe of the leaves of plants, we may be aſſured of from many inſtances; among the reſt, mercurial friction operates very ſtrongly upon the habit by this means. Cantharides, garlick, and ſulphur, enter the pores of the ſkin likewiſe: and it has been urged too, in proof of this property, that were it not true, the balance between the external and internal air could not be kept up and regulated.

But although the doctrine of abſorption is ſo well eſtabliſhed, as to render farther proofs altogether unneceſſary, yet the following remarkable inſtance of the power of this principle, which I was informed of by a gentleman whoſe veracity I can anſwer for, is not unworthy of being recorded.

The captain of a Weſt-Indiaman informed him that, in conſequence of the misfortune of his ſhip's foundering at ſea, he, and many of the crew, were obliged to take to their boat. Here they were expoſed to the miſerable alternative of drowning or ſtarving. They remained in this ſituation many days, and ſeveral of the ſailors were actually ſtarved to death. When the captain grew feveriſh, and laboured under that inſatiable thirſt which is the uſual attendant on ſuch a ſtate of inanition, recollecting to have read or heard that ſome in their circumſtances had been relieved by dipping their cloaths in the water, and putting them on wet, he tried the experiment himſelf, and prevailed upon ſome of his companions to do the ſame. The ſucceſs of it was even beyond their hopes; it refreſhed them immediately, and very ſoon took off their thirſt; nor, as they continued to repeat the experiment, did they ſuffer at all afterwards from that diſtreſſing ſymptom. He obſerved that the cloaths dried very faſt, and that there was a conſiderable cruſt of ſalt formed upon the ſurface of the body, which they ſcraped off as often as they refreſhed themſelves with wet cloaths. By this means they ſupported themſelves till they were wonderfully relieved from their diſtreſs by another ſhip; while thoſe wretches, who refuſed the aid of this expedient, periſhed.

FROM this hiſtory it is very evident that water, perhaps pure element, was copiouſly imbibed by the abſorptive powers of the ſkin, and conveyed into the body in ſuch a quantity, as to prevent the juices from growing acrimonious for want of dilution, and to carry off the fever which is neceſſarily brought on by that means: for this captain declared, that after he made uſe of the above-mentioned expedient, his ſpirits became chearful, and he felt not the leaſt thirſt.*

But though there may be a poſſible admiſſion of the poiſonous miaſmata into the conſtitution through the ſkin from this principle of abſorption, yet probably the poiſon very ſeldom exerts its influence upon the habit in this manner. Poſſibly by a local and actual application of the groſs matter lodged in the cloaths, or conveyed by the touch of a diſeaſed patient, the diſtemper may ſometimes be produced by a kind of inoculation, and then the diſorder will probably be favourable; but when the poiſon, in a more diluted ſtate, only floats in, or impregnates the air, I believe it ſeldom enters the pores of the ſkin, and poiſons by the way of abſorption; for the degrees of activity in which this power is exerted, are moſt probably in proportion to the aids the conſtitution may ſtand in need of from it.

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* This account was likewiſe publiſhed in one of the public papers.

In caſes of great inanition, as in the inſtance of the perſons juſt deſcribed, it is very probable, in that hungry ſtate of the conſtitution, when the demands of nature are not ſupplied by the ordinary channels; in this diſtreſſing ſtate of things, I ſay, it is very probable that all the powers of animal life exert themſelves to prevent the deſtruction of its being. And hence no bad argument may be drawn in ſupport of the commonly received opinion, that very old people, ſleeping with young ones, imbibe principles of life and renovation to a certain degree.

But whether this opinion be well founded or not, yet, as it is ſo much eaſier to imbibe ſickneſs than health, thoſe perſons who are obliged to attend the ſick in hoſpitals, &c. where the atmoſphere is frequently loaded with floating putrid poiſon, would do well to uſe the caution which this principle ſuggeſts, and, before they viſit their patients, keep their veſſels full by a previous hearty meal, and not plunge into ſuch a diſeaſed air when the abſorptive powers of the conſtitution are active from a ſtate of hunger and inanition.

But to return. It is more than probable, however, that the ordinary mode of infection is by the lungs, that important organ, ſo formed and calculated to adminiſter and to convey to the conſtitution the benefit of all thoſe ſalutary properties of the air that are ſo neceſſary to the purpoſes of animal life; and, for the ſame reaſon, but too capable of conveying to the blood the morbid particles of a contagious diſeaſe; which, from their ſtructure, we may be very ſure they are well calculated likewiſe to receive, to entangle, and to retain.

For the innumerable bronchial ramifications terminating in as many bladders, or veſicles, the ſum of whoſe ſurfaces in a human ſubject have been found by calculation to exceed the external ſurface of the whole body; and the lungs being likewiſe of a lax delicate texture, as well as of ſo extenſive a ſurface, they cannot, on theſe accounts, but be extremely obnoxious to the influence of ſo active a poiſon as the variolous effluvia.

Dr. Mead is of opinion, and indeed it is now generally believed, that the ſeeds of the plague are moſt frequently conveyed from infected places in bales of goods, particularly ſuch as are damp; that in theſe more eſpecially they will likewiſe remain a conſiderable time in a ſtate capable of active miſchief; and that calicoe, or cotton ſtuffs, are, of all other ſubſtances, the moſt calculated to lock up and retain in their entangled texture the morbid taint. Whoever, with theſe facts in view, conſiders the ſtructure and intricate texture of the lungs, and their ſtate in an act of inſpiration, when the morbid fomes is applied to the whole wide extent of ſo tender a ſubſtance, and is in immediate contact with ſuch an infinity of delicately ramified blood veſſels; and then conceives them, while in this humid ſtate, cloſing upon the poiſonous particles in the act of expiration, cannot doubt of this organ's being perfectly qualified for entangling and retaining the miſchief, as well as afterwards conveying it to the conſtitution.

It is poſſible too that the ſtomach may have the miſchief applied to its ſurface by a conveyance of the poiſon with the ſaliva; but I believe this mode of infection is by no means ſo common as that by the lungs, that great medium of correſpondence between the air and the animal œconomy.

Now, when either of theſe organs is firſt and particularly affected by the morbid ſomes, there is the ſtrongeſt reaſon to ſuppoſe that thoſe noble parts, together with the fauces, glottis, aſpera arteria and œſophagus, will frequently labour under a greater load of puſtules than the external ſurface of the body: for we obſerve, when the patient is infected artificially, that the parts to which the poiſon is applied ſuffer in a greater degree than the more diſtant; and that the circumjacent ſkin, to ſome extent, is peſtered with puſtules. Similar effects are produced alſo by ſimple contact, where a perſon, who has never paſſed the ſmall-pox, lies in the ſame bed with children under the diſorder. And on the ſame principle accordingly, in the natural ſmall-pox, with which patients are moſt probably infected in the above manner, we frequently find, by the hoarſe cough, difficulty of ſwallowing, ſoreneſs of the throat and breaſt, and by inſpection of the throat and glottis, that theſe ſeveral parts before mentioned are actually loaded with puſtules, and ſuffer very conſiderably from them in their ſtate of inflammation.

From this particular application of the morbid matter to the fauces, throat, and lungs, I am perſuaded the large diſcharge of ſaliva, &c. ariſes, which characteriſes the confluent ſmall-pox, and which makes its appearance in grown ſubjects from the time the ſtate of inflammation begins. The perpetual ſtimulus ariſing from the puſtulary, enflamed ſtate, and painful condition of thoſe parts, neceſſarily provokes a more than ordinary diſcharge from the ſalivary glands, which thus affected become a conſiderable and uſeful outlet to the morbid matter. But as children never ſpit off the ſaliva ſecreted in the mouth, or what is coughed up from the lungs, but ſwallow both, in them it is therefore of courſe thrown off by a diarrhœa, which anſwers the purpoſe of the ſalivation in adults. It is, I ſay, moſt probable, therefore, that the characteriſtic ſymptoms of ſalivation in grown ſubjects, and the diarrhœa in children, ariſe from the above circumſtance.

The fever attending the ſmall-pox, from the commencement to the termination of the diſeaſe, muſt always be conſidered as having two periods. That in which the patient is attacked on the firſt notice of the diſorder, is very properly termed the eruptive fever; and this ordinarily continues till the variolous matter in the conſtitution of the ſubject is wrought up, and the conſequent eruption is finiſhed.

In the mild diſtinct ſmall-pox, when the puſtules are few, and happily diſtributed over the body, both within and without, in an equable and uniform manner; on the very firſt appearance of the pimples, the fever abates, and continues ſo to do as more puſtules appear, till it totally ceaſes upon their complete eruption, which is ordinarily about the third or fourth day from their firſt appearance. After this, the feveriſh habit, which comes on as the puſtules enflame and advance to maturation, is merely ſymptomatic, and ordinarily ſo ſlight as to give no reaſon for apprehenſion, unleſs the pain and inflammation attending ſuch a number of little abſceſſes are injudiciouſly heightened by the heat of the bed, or an improper regimen.†

WHEN the maturation of the puſtules is fully compleated, the inflammation at the baſe, with the conſequent soreneſs, goes totally off; and the feveriſh habit then ceaſing, the proceſs of the diſeaſe is completely finiſhed.

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† This experience frequently evinces; for we often find that a fever, at firſt ſimply inflammatory, may, by exceſſive heat and rapid circulation, and the conſequent injury to the craſis of the blood, be converted into one of a putrid character.

But this is not the caſe with the unhappy patient in the confluent ſmall-pox, when the internal parts are invaded, indeed oppreſſed, with great numbers of puſtules; there is then no interval between the eruptive and the ſubſequent ſymptomatic fever. The diſtreſſed feelings which the patient labours under from ſuch a generally enflamed ſkin, heightened by the diſeaſed condition of the *nobler parts*, perpetuates the firſt fever, which is of courſe increaſed by throbbing lancinating pains, as the parts invaded with the variolous poiſon advance in their ſtate of inflammation.

Here then, a large diſcharge from the ſalivary glands excepted, the only poſſibility of a happy termination to ſo formidable a diſeaſe, ſeems to be founded on the hopes, that the *nobler organs* not being ſo far vitiated as to be rendered unfit for the purpoſes of life, the whole proceſs of ſuppuration, in every part of the body, internal as well as external, may poſſibly proceed uniformly; and having gone through as complete a maturation as the ſtate of the conſtitution will admit, the fever may then ſubſide and diſappear. But, unhappily for the patient, this is frequently not the caſe; the continuing fever, the effort of oppreſſed nature, gives ſufficient information, that all is not ſo well within as external appearances might otherwiſe have induced us to believe; but that the *nobler parts* are perhaps rendered even unfit for the purpoſes of life; at leaſt, that labouring and lagging behind in the proceſs, they have not kept pace with the apparent ſtate of the diſeaſe on the ſurface of the body.

THIS I take to be the true and general cauſe of the *ſecondary fever*; that formidable ſymptom, ſo frequently fatal in this ſpecies of the diſeaſe; ſometimes ſeen in the diſtinct natural ſmall-pox, but ſcarcely ever in the inoculated ſubject.

I MUST here obſerve, that it is impoſſible the exiſtence of this fever, or the cauſe of it, ſhould be certainly known, till the proceſs of the diſeaſe on the ſurface of the body is finiſhed; when we hope, indeed naturally expect, that the fever, kept up by the general apparent ſtate of the inflammation ſhould ceaſe; but in this ſtate of the diſorder, it is found by every ſymptom of diſeaſed lungs, as well as by actual diſſection, that patients, amidſt thoſe miſerable circumſtances, die peripneumonic.

HAVING ſeen the dreadful conſequences which muſt frequently attend this mode of infection; or, if I may be allowed the expreſſion, inoculation by the lungs, we will cloſe this *third ſection* by obſerving, that if ſuperadded to the unhappy ſituation of the formerly deſcribed patients, we ſuppoſe them poiſoned by the variolous fomes in this moſt pernicious manner; and that, beſides the immediate action of the poiſon on this important organ, the firſt ſubject with all the powers of inflammation in an exalted ſtate; and the ſecond, with the misfortune of a putreſcent ſtate of blood; alike labour under a greater load of variolous matter (from that critical and unfavourable aptitude to the diſeaſe at the time in which they were ſuppoſed to be infected) than the conſtitution can ſtruggle with; we cannot wonder that the diſorder is aggravated, and the chance of life leſſened by the ſuperadded miſchiefs of a ſecondary fever.

We will now draw towards a concluſion of this melancholy ſubject, by conſidering how far the diſtreſs of an unhappy patient may be ſtill wrought up by the influence of the fourth and laſt article, namely,

THE malignant or putreſcent ſtate of the air, or conſtitution of external nature, at the *time* of infection.

THE importance, and indeed fatal effects of this principle, are ſo generally acknowledged and well underſtood, that little needs be ſaid to enforce a conviction of the dreadful miſchiefs it is likely to produce in a ſubject labouring under an epidemic ſmall-pox, and particularly in thoſe under the former ſuppoſed circumſtances.

SYDENHAM, Mead, and many other writers of character, have judiciouſly remarked, that the plague itſelf loſes its terrors, becomes leſs formidable, and even mild, when the fomes of the diſeaſe is not aſſiſted by this principle. Whether this conſtitution of external nature produces its deleterious effects by heightening the natural malignity of the infecting poiſon, by rendering it more actively contagious, and communicating it, in a ſublimated ſtate of malignity, to the juices of the conſtitution, before ſuppoſed ſound and healthy; or whether this unfriendly ſtate of the air acts upon the conſtitution itſelf in ſuch a manner as to diſpoſe the blood and humours to putrefaction, rendering the effects of contagion, by this preparation for its deadly miſchief, more peculiarly fatal; which ever of theſe opinions is true, (though I am inclined to believe them both well founded) the conſequence of this indiſpoſition in external nature, and its terrible effects upon the human body, are juſt the ſame.

THE two general characters of a morbid ſtate of air, are the putrid, and inflammatory; and we uniformly obſerve, whenever any one is attacked with a fever under either of thoſe prevailing diſpoſitions, that it never fails to impreſs its character upon the diſeaſe.

WHEN the angina maligna made its firſt appearance in the weſtern part of this kingdom, about thirty years ſince, its effects were, for the firſt year or two, as deadly, and frequently as ſudden too, as thoſe of the plague. I ſaw ſeveral inſtances, where the diſeaſe, even after it was well underſtood, (laughing, nevertheleſs, every medicinal effort to ſcorn) deſtroyed the patient in thirty hours. The ſubjects of this diſeaſe were thoſe of a tender conſtitution, chiefly children, and women of a delicate habit; yet while the malignant conſtitution of the air continued to ſupport the virulence of the diſeaſe, almoſt all who were ſeized with fevers, either from colds, intemperance, or any other cauſe, diſcovered evident ſymptoms of a putrid tendency.

I VERY well remember, when the malignant ſore throat firſt raged in this town, I refuſed to inoculate ſeveral perſons who applied to me, one particularly, who came on purpoſe from a conſiderable diſtance; and upon this principle, viz. the great reaſon there was to fear that the predominant diſpoſition, then ſubſiſting, to putrefaction, might impreſs that character on the variolous fever. And indeed the truth of this apprehenſion was too well proved by a well-known inſtance, viz. that of two children of a gentleman in this town, who being inoculated under that prevailing influence, both died, with all the ſymptoms attending a putrid fever.

As it is therefore unneceſſary further to enforce a truth ſo very evident, and indeed generally acknowledged, I ſhall only avail myſelf of the efficiency of f this principle, as the fourth and aſt cauſe of miſchief; and obſerve, hat if a patient, of either of the two efore deſcribed habits, could be ſup- oſed to have his calamity heightened, t would be ſo by this prevailing ma- ignant tendency, which, by uniting ts baneful influence with that of the ther ſources of his miſery, would roduce a train of the moſt mortal ymptoms, viz. petechiæ, black puſ- ules, and partial mortifications; leak- ges of a diſſolved blood through the otten veſſels, and at times, perhaps, an univerſal necroſis. In ſhort, from the combination of ſo many engines of miſchief, we cannot be ſurpriſed at a ſmall-pox as deadly as the plague itſelf.

As, I think, we have ſhewn what was firſt intended, that the influence of one or more of theſe four principles under conſideration is capable of producing that variety we ſee in the diſeaſe; and that from the union of them all will reſult a natural ſmall-pox, complicated with all thoſe horrors we too frequently meet with in it: having, I ſay, eſtabliſhed the truth and conſequence of thoſe principles, and being now therefore furniſhed with materials to ſolve the problem we originally propoſed, viz. to account for the difference between the natural and artificial ſmall-pox; let us turn aſide from this melancholy ſcene of human miſery, to the pleaſing conſideration of that ineſtimable diſcovery with which Providence has bleſſed the world, and by which this formidable diſeaſe, quite diſarmed of its terrors, is rendered mild and gentle; and, perhaps, in general, leſs hazardous than a common cold.

I SHALL now proceed therefore with a ſhort kind of recapitulation in the order obſerved before, and ſee how far the *inoculated patient* is influenced by, or rather exempted from, thoſe four ſources of miſchief.

FIRST, The patient's *conſtitution*.

INOCULATED ſubjects then are infected with the diſeaſe (if children, at a time when they are not ſuſceptible of fear; always, however, if the proceſs is conducted with prudence) when the conſtitution of the patient is in the beſt condition to combat with the diſeaſe; viz. when by reſtrained diet, and proper purgatives, all accidental incitement to inflammation is prevented; a tranquillity in the animal œconomy is ſuperinduced; and every load or incumbrance by which the habit may be oppreſſed, removed; and in young ſubjects more eſpecially, any worms which may be lodged in the bowels, diſcharged.

SECONDLY, The *propenſity* of the ſubject to be *poiſoned* by the variolous fomes.

THE diſeaſe, in the inoculated ſubject, is *forced* on intentionally; and as it has been ſhewn that the propenſity to it differs at different times in the *ſame* ſubject, there is the greateſt reaſon to ſuppoſe that the diſorder is produced, if I may ſo expreſs myſelf, by downright violence, when there ſubſiſts in the patient but little of that *peculiarity* of conſtitution ſo eſſential to the production of the diſeaſe, and ſo *general* when the ſmall-pox is epidemic; or, in other words, when the body is indiſpoſed to be poiſoned. This conſideration, peculiar to the diſeaſe when artificially produced, I am perſuaded, is the true cauſe of the ſmall quantity of pocky matter (and that general ſcarcity of puſtules, when compared to the natural ſmall-pox) which has ever accompanied inoculation, and is one of the grand advantages of the diſcovery. Superadded to this conſideration, by the modern practice of expoſure to cold, the violence of the eruptive fever is ſo far moderated and kept under, as to prevent its forming an additional quantity of variolous matter, which, in a violent and unreſtrained ſtate, it would do by aſſimilating the juices of the conſtitution into the nature of the variolous poiſon.

THIRDLY, The *manner* or *mode* of communicating the infection.

WE have already ſhewn the importance of this conſideration in the natural infection, where the patient is ordinarily poiſoned through the medium of the lungs. By inoculation, the ſubject is infected by an application of the virus to the external ſurface of the body, which can therefore produce its miſchiefs to the habit no way but through the medium of the ſkin; ſo that the whole conſtitution (excepting the part immediately ſurrounding the wound) being affected uniformly by an equable diſſemination of the puſtules, though the patient ſhould have them pretty freely ſcattered, yet the proceſs of the diſeaſe is regularly carried on; and the noble parts within, not being particularly affected by a partial application of the variolous fomes to their ſurfaces, nor being oppreſſed by at moſt more than a common ſhare, have no diſtreſs to proclaim by a *ſecondary fever*, which is therefore ſcarcely ever ſeen in inoculated patients.

FOURTHLY, and laſtly; The *conſtitution* of the air at the *time* of infection.

No cautious and judicious practitioner would ever chuſe, when there was an epidemic, malignant influence in the air, to expoſe his patient to the pernicious effects of it, and to ſtamp its baneful character upon his diſorder, by inoculating during ſuch a ſtate of things; but would moſt certainly make choice of that ſeaſon when its diſpoſition, and temperature likewiſe, were beſt calculated for the purpoſe; conſequently, we rarely ſee the ill effects of this principle in the artificial diſeaſe.

FROM this view then of the *inoculated* and *natural* patient, and furniſhed with thoſe indubitable and important principles ariſing from it, we ſee with certainty (which is what I propoſed to inveſtigate in this Diſſertation) to what the grand ſucceſs of inoculation is owing; and that the manifeſt difference between the natural and artificial diſeaſe ariſes, *not from any particular ſecret, trick or mode of phyſical management, but from a happy and neceſſary concurrence of important circumſtances in favour of the inoculated ſubject; namely, the abſence of all thoſe miſchievous agencies to which a patient under the ſmall-pox, in a way of nature, is unfortunately expoſed.*

NOTWITHSTANDING all the advantages which inoculation neceſſarily enjoys, it may, and neceſſarily does,

ſome-

ſometimes though rarely happen, that an unfortunate patient is now and then by chance inoculated at a time when the conſtitution is in a high diſpoſition to be poiſoned, and almoſt ripe for a ſpontaneous production of the diſeaſe; and when, likewiſe, by ſome undiſcoverable indiſpoſition, the craſis of the blood is broken, or the fluids in an acrimonious ſtate. But even then, though the ſmall-pox may be of an untoward kind, yet by the *manner* of infecting the patient, the nobler parts not being *particularly oppreſſed*, he will ſeldom have his calamity increaſed by the additional danger of a ſecondary fever.

I SHALL detain the reader very little longer, only adding a practical remark or two (ariſing from the foregoing conſiderations) on the two diſorders.

From the great advantages which ariſe from expoſure to the cool influence of the air during the eruptive fever in the artificial, we may infer its uſe in the natural ſmall-pox; there being no reaſon why it ſhould afford ſo ſalutary an aid in the one caſe, and not in the other. And indeed I have known it actually attended with very great advantages. Even in the confluent ſmall-pox I have ſeen patients daily expoſed to the open air, from the commencement of the diſeaſe to its concluſion, with evident good ſucceſs. Even after they have been entirely blind from the ſwelling of the face, they have been led about a garden during the day in a mild ſeaſon; and from experiencing the conſtant advantages of that treatment, have dreaded the approach of bed-time, and accordingly waited for the morning with the greateſt anxiety and impatience; the diſeaſe being all the while accompanied in its progreſs with the moſt kindly ſymptoms that the degree of it would admit, and terminating happily. Nor is this to be wondered at, if we diveſt ourſelves of prejudice. Would any ſurgeon increaſe the ſymptomatic fever of his patient by the heat of the bed during the ſuppurative proceſs of an abceſs? Whoever conſiders the throbbing pain a perſon ſuffers from an inconſiderable riſing on his finger, when it is kept hot under the bed-cloaths, can never be ſurprized at the diſtreſs felt from the ſame circumſtances by one who has thouſands of little abceſſes all over his body, a great part of which ſuffer at the ſame time the additional uneaſineſs of preſſure. Indeed, were it not for the kindly and ſtupifying effects attending the charitable evening anodyne, which blunts the feelings of nature, the common practice of confinement in bed would, by the increaſe of the ſymptomatic fever, prove more deſtructive than it generally does. The cool refreſhing air, therefore, which firſt curbs, and in ſome meaſure quenches the *eruptive*, afterwards moderates the *ſymptomatic fever*, by preventing the aggravation of thoſe principles which cauſed it.

FURTHER; as we have reaſon to believe, from the practice of inoculation, that, in full habits, the violence of the eruptive fever, and the diſpoſition to inflammation, is ſafely leſſened by purging, at leaſt by emptying the inteſtines; this practice ought never to be omitted in the natural ſmall-pox, to which, in fact, it has been often applied with manifeſt good ſucceſs in that ſtate of the diſeaſe.

I FEAR inoculation furniſhes us with no other certain indications or rules of practice that may be advantageouſly transferred to the natural ſmall-pox; we will now, therefore, ſee whether any cautious, or practical precepts, can be drawn from the conſideration of the natural diſeaſe, and uſefully applied to inoculation, in order if poſſible to render it ſtill more ſecure than it is already.

It has been proved by reaſoning, grounded on indiſputable obſervation, that the variolous principle in the ſame ſubject is different at different times; that it is ſometimes more, at others leſs, ſuffering a kind of ebb and flow; or, in other words, that the body has at different times a greater or leſs propenſity to be poiſoned. And it has likewiſe been ſhewn, that there is the higheſt reaſon to ſuppoſe this propenſity to be greateſt when there is an epidemic conſtitution of the air, which favours the production of the diſeaſe. If this be true, and it be likewiſe highly probable that the ſeverity

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But the misfortune is, that though the epidemic conſtitution, above-mentioned, is not an eligible time for performing the operation, it is ſometimes ſcarcely poſſible to avoid it, though I have always yielded with reluctance; for people's fears, ariſing from the misfortunes of their neighbours, drive them to ſeek ſecurity in inoculation; and this too in the caſe of infants, where the riſque is greateſt, for they are always expoſed to more than common hazard, from circumſtances neceſſarily connected with their time of life; and there is certainly a greater loſs of inoculated patients under two years, than of all ages between that and threeſcore. All that can be ſaid, however, in ſuch circumſtances, is, that one conſideration muſt balance another; and if the patient cannot be removed from infection, and the riſque of it is very great, it will become reaſonable to give him all the advantages of inoculation that can be then had, and to perform the operation even under thoſe diſadvantages.

POSTSCRIPT.

It was my intention to have confined myſelf entirely to the ſubject of the foregoing inveſtigation, without animadverting on a mode of operating, at preſent ſo well and generally underſtood; or pretending to propoſe any improvement upon it. But as the methods now in uſe ſometimes, and indeed not unfrequently, diſappoint the expectations of both the operator and patient, by failing to communicate the infection, I hope to be excuſed, if, in few words, I deſcribe a method I have myſelf uſed for ſome time paſt, which has entirely exempted me from this inconvenience, and which the practitioner may, or may not, adopt, as he pleaſes. If the deſcription, however, ſhould appear unneceſſarily minute and particular to men of experience, I ſhall truſt my apology to the younger part of the profeſſion, who will not, perhaps, complain of too much preciſion.

THE two methods in general uſe are, either to inſinuate the point of the prepared lancet juſt under the cuticle, and by that means, without drawing blood, to apply the virus to the true ſkin, and conſequently to the extremities of the nerves and blood-veſſels; or otherwiſe, with the point of the lancet to produce the ſame effect, by a very ſmall ſuperficial ſcratch. Both theſe methods, it is well known, ſometimes fail, and diſappoint the intention.

In the firſt manner of inoculating, the extreme thinneſs of the cuticle in that part of the arm on which the operation is uſually performed, renders it very often ſcarcely poſſible to convey the poiſon under the ſkin without drawing blood, which may even waſh the virus quite off, or at leaſt ſo far dilute it, as to render the operation ineffectual. Or, if the operator is dexterous enough (which, however, in the caſes of young children, is exceedingly difficult) to introduce the inſtrument fairly between the two ſkins, it may then happen that the virus, (eſpecially if in a moiſt ſtate) having, in the moment of operation, been accidentally forced back from the point of the lancet, ſhall not be inſerted at all.

THE ſecond method of operating, though by a ſlight ſcratch, may alſo, by drawing blood, be attended with the ſame uncertainty.

HOWEVER, whether the reaſons above aſſigned are, or are not, the real cauſes of accidental failure, certain it is, that both thoſe methods are ſubject to it; and alſo, that diſappointments of this ſort are always diſagreeable, and ſometimes even embarraſſing to the operator and patient.

THE following method is that which I have ſucceſsfully uſed a conſiderable time, without having failed of infecting the arm in a ſingle inſtance.

HAVING formed a quill like thoſe belonging to camels hair pencils, a ſmall piece of very ſoft ſponge is driven into it, till part of the ſponge is puſhed quite through, ſo as to form a little papillary protuberance, about the ſize of a ſmall hemp-ſeed; at leaſt it may be cut into that ſize and ſhape with a pair of ſciſſars. The operator may, if he pleaſes, be provided with half a dozen of thoſe implements, which will be neceſſary if a number of patients are to be inoculated; the ſponges of all which may be ſaturated by the matter of two or three ordinary ſized puſtules.

HAVING then ſuch an armed ſponge ready, the arm of the patient ſhould be graſped underneath by the hand of the operator, ſo that his fingers and thumb on either ſide may put the ſkin on the upper part of the arm upon the ſtretch. Then with the point of a lancet, or ſome ſuch inſtrument, make two (leaſt one ſhould fail) very ſlight inciſions, about the tenth of an inch long; and ſo very ſuperficial, by ſeveral very tender and cautious touches, that the cuticle being but juſt cut through, the bottom of the ſcratch may appear but barely red, without bleeding; then, with the ſkin ſtill on the ſtretch, rub the armed ſponge on the wounds, till you are ſure the poiſon is intimately applied to them. After the inciſions are made, it will be proper however to wait ſome little time, in order to obſerve whether they are likely to bleed; for we frequently meet with ſubjects, particularly thoſe of a florid complexion, and plethoric habit, where the ſcarf-ſkin is ſo exceedingly thin, that it is ſcarcely poſſible by the moſt cautious touches to divide it without drawing blood; if that happens to be the caſe, the blood ſhould be repeatedly wiped off till it intirely ſtops, before the virus is applied. If the matter has been taken off any time, ſo that the ſponge is become dry and hard, this loſs by evaporation may be readily ſupplied by very ſlightly moiſtening the ſponge with water at the time of uſing it.

I have myſelf uſed an inſtrument for ſome years paſt, which I think is more convenient for the purpoſe of inoculation than a common lancet, both becauſe it is better held by the operator, and becauſe the whole apparatus,

paratus, ſponge and lancet, make but one inſtrument.

In a ſmall pencil-caſe, open at both ends, are contained the little lancet, and ſocket for the ſponge, ſo fixed at the contrary ends of a metal cylinder, as by the ſliding of it backwards and forwards, to offer themſelves ſucceſſively for uſe. It is, perhaps, unneſſary to ſay, that one of theſe little armed ſponges will be ſufficient for five or ſix patients.

For the ſake of thoſe who may chooſe to adopt this mode of operating, and wiſh therefore to be furniſhed with an inſtrument of this ſort, I have annexed a drawing of it.

FINIS.